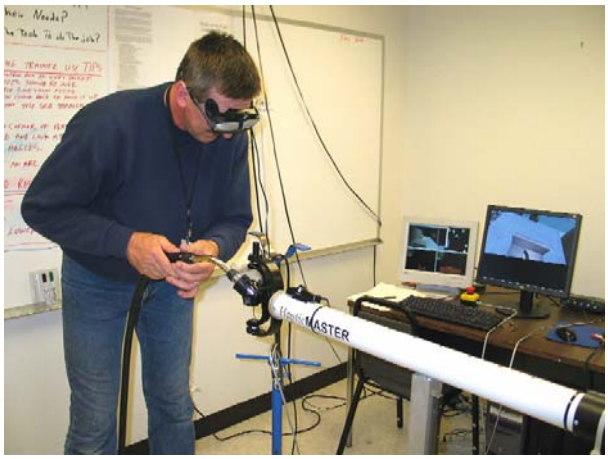
Virtual Reality Welder Training



The emphasis on system affordability in Navy ship construction is driving the need to improve the efficiency and reduce the cost of all manufacturing operations within the shipbuilding process. This also drives the need for additional skilled workers to build these high-value components. General Dynamics Electric Boat (GDEB) submitted a proposal to the Navy ManTech Program for funding a project to demonstrate virtual reality as a viable technology to train welders for submarine manufacture. Part of the Office of Naval Research, the Navy ManTech Program provides for the development of manufacturing technologies and their implementation in the production of Navy weapon systems.

A virtual reality approach to welder training can increase the effectiveness of training, reduce training time, and significantly reduce material preparation and acquisition costs associated with training. It is estimated that virtual welder training will reduce gas metal arc welder training costs at GDEB by $81K per year and increase overall welder productivity by $1.3M per submarine hull, representing a 2% productivity increase. A 2% increase in gas metal arc welder productivity alone will result in a $325K savings per submarine hull. Virtual reality training will also result in more highly skilled welders producing higher quality welds with fewer workmanship defects.

The system consists of a welding torch attached to a force feedback device, a head-mounted display, a six-degree-of-freedom tracking system for both the torch and the user's head, and external audio speakers. The system also incorporates enhanced graphics based on a finite element model of the weld pool, digital audio captures, and a haptic device for force feedback.

The virtual reality welding trainer is commercially available through VRSim. GDEB plans to integrate the trainer with its existing simulation and planning resources to allow welding engineering and training staff to visualize and simulate construction, repair, and maintenance operations on new or existing components. The trainer has already been implemented at the Northrop Grumman shipyard at Newport News, Virginia.